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RESEARCH AND DEVELOPMENT

11 DECEMBER 1979 (FOUO 15/79) 1 OF 1

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11 December 1979

# Worldwide Report

## TELECOMMUNICATIONS POLICY, RESEARCH AND DEVELOPMENT

(FOUO 15/79)

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## TELECOMMUNICATIONS POLICY, RESEARCH AND DEVELOPMENT

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PEOPLE'S REPUBLIC OF CHINA

BRIEFS

TELECOMMUNICATIONS SATELLITE PREPARED--Under the code name "New Long March III," the PRC is preparing to put its first telecommunications satellite in orbit between 1980 and 1981. It is continuing work on its long-range [launch] rocket, test-firings of which have already taken place. [Text] [Paris VALEURS ACTUELLES in French 19 Nov 79 p 35]

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USSR

UDC 621.395

DEVELOPMENT OF AUTOMATIC CONTROL SYSTEMS FOR IMPROVING COMMUNICATIONS

Moscow ELEKTROSVYAZ' in Russian No 9, 1979 pp 36-39

[Article by T. M. Tokhtayev, submitted 20 Mar 79]

[Text] In the Uzbek SSR, the problem of improving the effectiveness and the functional quality of communication networks is being solved successfully through automation and centralization of their technical operation. Among other things, positive experience has been accumulated in automatic control of city telephone networks and in the creation of automatic control systems. Timur Makhsudovich Tokhtayev, Minister of Communications of the Uzbek SSR, tells in this article about concrete measures for improving the effectiveness of communications in the republic.

Introduction. Modern electrical communication is a complex dynamic system which cannot be controlled without a wide introduction of automatic, telemechanical, and computing devices. The prospects of intensive growth of the capacities of telephone networks make it necessary to increase sharply labor productivity and improve considerably the quality of communications. At this stage, it is necessary to automate the processes of revealing damages, registration of telephone loads, determination of the main operational indices of stations and centers, obtaining information pertaining to their maintenance, and analysis of the quality of communication work.

Now the structures of the city telephone networks are operated chiefly by the preventive method. Regardless of the technical condition of the equipment, a large volume of planned and preventive checking and adjusting is done. This requires considerable labor and monetary expenditures and does not guarantee high quality functioning of the equipment. Preventive inspections actually do not improve the condition of the instruments and communication lines, but only reveal part of the damages present at the moment and, moreover, the actions of the numerous technicians, who are sometimes unskilled, may cause damages.

The effectiveness of maintenance depends greatly on the reliability of information regarding the condition of individual components, assemblies, and the entire telephone network as a whole. The existing manual system of gathering information, due to its limitations with respect to the speed of work and subjective characteristics of individual workers, cannot cover fully and timely the changes occurring in the telephone network and register them. Moreover, the existing methods of evaluating the work of an enterprise by the improvement of quality indices rather than by absolute indices is not as sufficiently effective stimulus in the work of the maintenance personnel. As a result of this, untrue information is sometimes given regarding the condition of the network.

The communication industry has its own peculiarities. The main peculiarity is that communication enterprises do not produce any physical product. The product of communication systems is the establishing of connections among consumers and transmission of information.

The nonphysical nature of communication services creates definite difficulties in the system of evaluation of the operation of communication enterprises and in the process of production quality control. Let us examine this on the examples of the comparison of the quality evaluation systems existing in industry and communication.

In many sectors of the national economy, the quality of manufactured products is controlled repeatedly and at various levels. For example, in producing industrial goods, the primary control is done by leading workers who have their own inspector's stamp. Secondary control is carried out by the department of technical control of the enterprise, where the products are classified according to their grades. Committees of trading enterprises perform sampling inspection of batches of industrial products and, if their quality is below standard, they are not accepted for sale. The last stage of control is accomplished by the buyer, who has the right to return the article to the trading enterprise if he finds it to be of low quality.

Thus, the system of the estimation of the quality of products existing in industry makes it possible to evaluate the work of individual performers, brigades, sections, shops, and the enterprise as a whole and to establish who is responsible for putting out low-quality products, including those produced several months ago.

Quality control at communications enterprises differs considerably from production control at industrial enterprises due to the inseparability of the process of production and consumption of the products of the communication industry. For example, in placing a long-distance telephone call for a consumer, the product is the establishment of the connection, a call to the subscriber of another populated center, and the assignment of a communication channel for the call. Quality control is accomplished by the telephone operator and the consumer. Production quality is evaluated subjectively, and there are no documents confirming the level of quality. In this case, the consumer does not have the possibility of returning a low-quality product in exchange for a new product or to get his money back.

The improvement of the quality of telecommunications and telephone networks is the most important task of communications workers. The Ministry of Communications of the Uzbek SSR, on the basis of theoretical and experimental studies conducted jointly with the Tashkent Electrical Engineering Institute of Communications (TEIS), determined that automation and centralization of technical operations are the main directions in solving this problem. For this purpose, the Republican Communications Quality Control Center (RTsKKS) is being created in Tashkent. It will be using reliable information (breakdown, operational, and statistical report data) regarding the condition of the equipment of stations and centers, communication channels, and communication lines, will, with the aid of electronic computers, issue the necessary decisions which will make it possible to improve the quality of communications and control their fulfillment. Devices for automatic control and evaluation of the quality of the functioning of equipment and external plants were developed specially for RTsKKS.

For example, the Tashkent GTS [city telephone station] organized an automated repair office (ABR) on the basis of an YeS-1022 electronic computer which makes it possible to control the city-wide communication network, electronic equipment located at a central ATS [automatic telephone exchange], and remote measuring units installed at each rayon ATS. At the ABR, the processes of receiving calls from subscribers of GTS and responses to them are automated, for which, special technical means of measuring, switching, and computer software are created. The following information was fed into the electronic computer of the ABR: address of the telephone owner, his surname, first name, patronymic, or the name of the organization; technical data of the subscriber's lines and information on the electricians assigned to particular block terminals. This structure of the computer data base was designed with consideration for a minimal searching time, extraction, introduction, and arrangement of additional information on magnetic carriers and with consideration for the development of the city telephone network.

Information about the changes occurring in the network is processed on the electronic computer and goes to monitor printing. This includes: signs of damages in subscribers' lines received from the automated measuring system (ASI); information received from a remote measuring unit; information about the reconstruction of cables and their damages, about changes in the technical data of subscribers' lines, about the development of the GTS, about the numbers of newly installed telephones, about electricians, etc.

At the same time, the electronic computer issues information about the condition of the lines (damage code) for automatic response to the subscriber and instructions to the electricians for correcting these damages. When the damages are corrected, the electricians report this to the ABR, which is automatically registered by the computer for the analysis of the time spent on repairs. In addition to the above, the ABR makes it possible to connect automatically to the subscriber and warn him about the disconnection of his telephone for various reasons: for nonpayment, due to the reconstruction of line and cable structures, and due to switching to other telephone stations.

On the basis of the statistical data received at rayon ATS, the quality indices of the operation of the entire Tashkent GTS are analyzed with the aid of an electronic computer.

The Republican Communications Quality Control Center also includes an automatic control system for coin-operated telephones (ASKT) which was introduced at the Tashkent GTS in 1978. The ASKT is intended for complete automation of the control over the condition and functional quality of coin-operated telephones. It monitors the parameters ofthe lines of coin-operated telephones, the presence and working condition of its individual assemblies, and measures the load of each coin-operated telephone. Information about the number of the telephone and its condition is sent to a telegraph apparatus or a communication channel with an electronic computer.

The ASKT has three operation modes. The first mode monitors the condition of the line for: wholeness of the loop, short—circuit between a and b wires, low insulation resistance, and presence of outside polarity. Moreover, it monitors the malfunctioning of the coin mechanism and electrical circuit of the telephone, as well as the presence of the hand set and the dial. Checking 100 coin-operated telephones in this mode and the printing of the information takes 4-5 minutes.

The second mode of the ASKT monitors the functioning of subscribers' sets and coin-operated telephones during calls. It monitors the following: the presence of the dial tone, functional quality of the dial, correctness of payment for the call, and the establishment of the connection. In this mode, the system ensures the monitoring of the functional quality of coin-operated telephones. Up to the present time, such monitoring required the participation of line electricians.

In the third mode, the ASKT determines the load of each coin-operated telephone by the number of calls and their lengths, which makes it possible to space telephones correctly over the area of the city.

The system is designed as a portable apparatus 490 x 320 x 200 mm weighing 15 kg.

Coin-operated telephones in city telephone networks of the USSR are now monitored with the aid of coin-operated telephone control desks (SKTA). The checking is done by an operator with participation of an electrician maintaining coin-operated telephones. It takes several days to check all coin-operated telephones of one ATS (up to 200 telephones). Therefore, the advantages of the ASKT are obvious: 1. Information about the condition of all coin-operated telephones of an ATS can be obtained with the aid of ASKT in a few minutes. 2. Coin-operated telephones are checked without the participation of special line electricians maintaining them. 3. It is possible to automate the registration of the main parameters of streams of calls. 4. Since the results of checking are recorded on a perforated tape, its processing is done on an electronic computer.

The Tashkent city telephone network has developed and is testing an automated control system for the quality of the establishment of connections (ASKKUS). The monitoring of nonpassage, outputs of group selection stages, and functional state of connecting lines is done now by nonautomated (manual) methods, which, due to their laboriousness, makes it impossible to obtain an objective picture of the condition of the telephone network. There are only some devices for automating some parts of such checking: an automatic dialing device and an answer-back device, but there are no systems analogous to ASKKUS.

The use of the ASKKUS makes it possible to obtain the picture of the condition of the telephone network effectively (excluding subscribers' lines and sets) and to reveal damages both in the ATS instruments and in connecting lines. However, subscribers' lines and sets can be checked by means of the ASI of subscribers' lines [3].

The ASKKUS has two modes of operation. The first mode is the control dialing mode (removal of nonpassage). It makes it possible to perform centralized dialing from each control number to another control number both within the ATS, and within the entire network. The connection to various numbers is done with the aid of a switching device located in the terminal room of each ATS.

In the second mode, the ASKKUS checks the functional state of the connecting lines one after another, as well as that of instruments connected with them. Here, the following sections are monitored: output of IGI [pulse generator] -- input of outgoing RSL [trunk line relay];output of IIGI -- input of outgoing RSL; outgoing RSL -- connecting lines; connecting line -- incoming RSL; incoming RSL -- incoming GI.

At the Tashkent GTS, 10-12 engineers take care of nonpassage of communication, but the ASKKUS requires only one engineer. The use of the ASKKUS at the GTS of Tashkent just in the first mode yields an economic effect of more than 19,000 rubles a year.

Along with the creation of instrumental means of automating the quality control of communications, program and algorithmic problems are being developed which ensure machine data processing of these devices.

The following subsystems were delivered by the Republican Information and Computation Center (RIVTs) in 1978: a subsystem for prevention of damages and issuing instructions to electricians, a subsystem for the registration and analysis of the conditions of cables of the main network, a subsystem for the registration and analysis of the states of cables of the distribution network. Operation of the following subsystems is continued: "Automated Accounting of GTS Subscribers", "Accounting", "Accounting of the Fixed Capital of the Khamzinskiy GTS Telephone Communication Center". "Effective

Control of the Progress of the Fulfillment of National Economic and Production Plans of the GTS".

RIVTs and the ASU laboratory of the Tashkent MTS [long-distance telephone exchange] are continuing joint work on the creation of the automatic production control system (ASUP) of the MTS. The subsystem "Automatic Accounting of MTS Subscribers" has been in industrial operation since 1975. In 1978, the software of this subprogram was revised, which made it possible to introduce information about two calls on one punched card. The expected annual saving is about 30,000 rubles.

Intensive work is being done on the automation of the gathering of the data on the work of the switchboard department. A system of automatic registration of the output of telephone operators has been introduced, as well as a control desk of the head of the call booking service which makes it possible to register information about the output of telephone operators. Work is nearing completion on the development of an information display system of the output of each telephone operator and an information display board reflecting the state of long-distance communication in various directions.

Accelerated solution of the problems on improving the quality of communications is facilitated by ASU laboratories created at a number of enterprises in Tashkent.

In the Srednechirchikskiy Rayon of the Tashkent PTUS [Production and Technical Administration of Communications], the ASU laboratory introduced a system of centralized control of rural telephone communication. A special dispatcher's desk controls the quality of the connecting lines of rural ATS and checks telephones selectively. The operational information obtained as a result of this monitoring is transmitted to the PTUS and is used for taking measures to eliminate damages. Provision is made for machine processing of the data. A zone metering device for long-distance calls has been created whose introduction makes it possible for the subscribers of Chirchik of Tashkent Oblast to have telephone connections with other cities of the USSR.

The ASU laboratory of the Tashkent Central Telegraph has developed the problem of automated accounting for the subscribers of the ATA [automatic teleprinter exchange].

The workers of "Soyuzpechat'" [Main Administration for the Distribution of Publications] enterprises process a huge volume of information every year during the subscription period. The ASU laboratory of "Soyuzpechat'" studied the experience of the introduction of an automated subscription system in Moscow and Kazan'; development of such a system is nearing completion.

The ASU laboratory of the City Production and Technical Administration of Postal Communications is collaborating with the Leningrad Zonal Computation Center. They have developed basic algorithms of solutions for five problems of automatic preparation of accompanying documents and planning and accounting documents for periodicals. The work on the adaptation of the project of the optimization of the routes of postal transportation to the existing network has been completed, and initial data for computing variants of optimal routes of postal transportation have been prepared.

Operation of a number of OASU-"Svyaz'" subsystems at the level of the republican ministry is continued. The operation of the subsystem "Control of Material and Technical Supply" is improving. It will make it possible to take inventory of commodity stocks at the warehouses of the GUMTS [Main Administration of Material and Technical Supply] base effectively and, consequently, to take measures for eliminating above-norm stocks and a broader planning of supplies to communication enterprises. The problems of the subsystem "Registration and Selection of Managerial Personnel" are being solved. In order to improve long-distance telephone and telegraph communications, work is being done on the problems of effective registration of the remaining untransmitted telegrams in the telegraph network of the republic. GUKS [Main Administration of Capital Construction] has ordered the subsystem "Accounting and Analysis of Economic Activity", and the Financial Planning Administration of the Ministry has introduced the subsystem "Operational Registration of the Fulfillment of Quantitative and Qualitative Indices".

The realization of all measures enumerated above will substantially improve the quality and effectiveness of communications in the republic.

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[6-10,233]

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USSR

CONFERENCE ON RURAL TELEPHONE COMMUNICATIONS HELD IN KRASNODAR

Moscow ELEKTROSVYAZ' in Russian No 9 1979 pp 39-42

[Article based on materials prepared by I. V. Kovaleva]

[Text] The most important statewide goal of today is: acceleration of the rate of development of agriculture on the basis of maximal intensification of production, wide-scale land reclamation, overall mechanization, wide use of chemicals, and more complete utilization of the resources and potentialities, achievements of science, technology, and advanced experience. It is impossible to fulfill this program without mobilizing all available resources, one of which is the intensive and complex development of the telephone communication and production control facilities in all sections of agricultural production.

The problems of improving operational qualities of rural telephone communications on the basis of new advanced methods were discussed at the All-Union Conference of Communication Specialists held in May of this year in Krasnodar. The conference was organized by the USSR Ministry of Communications and the Krasnodarskiy Kray Production and Technical Administration of Communications. It was attended by 160 representatives of all oblasts of the RSFSR and a number of other union republics.

The opening address to the participants of the conference was given by G. G. Baytsur, USSR Deputy Minister of Communications. He stressed the importance of conducting this conference in the light of the decisions of the 25th CPSU Congress and the July and November (1978) Plenums of the CPSU Central Committee and characterized positively the development of communications during the three years of the Tenth Five-Year Plan. The plan for the introduction of an ATS STS [automatic telephone exchange of the Rural Telephone network] has been overfulfilled by 11.7%, the plan for the expansion and reconstruction of internal networks in sovkhozes -- by 13.2%, and in kolkhozes -- by 1.3%. Simultaneously with performing a large volume of work for the development of rural telephone communication facilities, ministries of the union republics and the PTUS [Production and Technical Administration of Communications] are implementing organizational and technical measures for the improvement of the condition and operation of communication facilities and improvement of the structural schemes of the networks.

As the technical resources develop, the networks are switched to a single-step structural scheme, where the terminal ATS are connected directly to the ATS of the rayon center. In 1978, more than 1000 manual stations, as well as outdated ATS operating unstably, were replaced with crossbar ATS. Crossbar stations in the STS [rural telephone network] constitute 96%. In order to increase the number of interstation multiple trunks in the STS, high-frequency channels are being introduced intensively, thousands of kilometers of overhead communication lines are being repaired, and hundreds of thousands of poles are being replaced and reinforced; as a result of this, the mechanical strength of rural telephone communication lines has been increased considerably.

A number of PTUS are introducing successfully the complex system of communication quality control (KSUKS). Work is being done on the introduction of new types of cables, switching, transmission, and control systems, process charts, instructions and handbooks on the operation of STS facilities. On the basis of the work experience of communication workers of the Krasnodar, Leningrad, and Smolensk PTUS, Ministries of Communications of Ukrainian, Belorussian, and Estonian SSR, a centralized method of operating STS networks is being introduced.

At the same time, there are still important defects in the organization of the operation of STS facilities and telephone services to the population. This includes the following: poor organization of work on the elimination and registration of damages; inadequate control over the reliability of the initial recording of the operational indices of STS; understatement of plans for major overhauls of lines and underfulfillment of these plans. Slow rate of work in the elimination of intersections with electric power transmission lines; large numbers of damages of cable lines by other organizations; low quality and rates of construction of STS facilities; failures to follow the techniques of installing joints, crossings through water obstacles, etc.

Faults in the work of low-level communication workers must be eliminated as soon as possible in order to fulfill successfully the goals of the Tenth Five-Year Plan and to increase the effectiveness of control in agricultural production.

The Ministry of Communications, Ministry of Agriculture, State Committee for Production and Technical Services to Agriculture and their representatives in the provinces, being supported by active aid of the Councils of Ministers and kray and oblast executive committees of the Soviets of People's Deputies, will undoubtedly ensure the fulfillment of the goals set by the 25th CPSU Congress and Decree of the USSR Council of Ministers on further development of telephone communications in rural areas and production control communications in the agricultural production. This will make a substantial contribution to the development of agriculture, its technical reequipment, strengthening of the kolkhoz and sovkhoz economy, and services to the rural population.

A detailed report on the "State and Ways of Improving the Operation of Rural Telephone Facilities" was presented by the head of the Main Administration of Rural Telephone Communications of USSR Ministry of Communications, G. S. Voloboy.

It was pointed out at the July (1978) Plenum of the CPSU Central Committee that the development of agriculture is a matter of nationwide concern. Reliable communications increase considerably the utilization time of agricultural equipment, reduce sharply its idling time, and raise considerably the level and the efficiency of management in agriculture.

Considering the importance of the development of communications in agriculture, the USSR Council of Ministers passed a special resolution in 1977 on the development of rural and production control communications which set important tasks for the communication workers of the country for further improvement of rural telephone communication facilities with a breakdown of the goals by years and for each republic. Appropriate guidelines were also accepted in other union republics.

The speaker named the ministries of communications and PTUS which are successfully fulfilling the tasks for the development of STS and VPTS [intraorganizational telephone communications], as well as those that are lagging.

The percentage of new STS capacities has increased. The overfulfillment of the plan of the communication industry, and the growth of automation and of the level of utilization of installed equipment contributed to the improvement of economic indices of rural communications, and to the acceleration of the rate of growth of the production volume and income from paid calls. The capital-labor ratio in STS is higher than that for the communication industry as a whole. However, the profitability of this industry is still low; it is necessary to use large country-wide resources. They include: putting fixed productive capital into operation, improving the rates, and lowering of operational expenses.

Rural telephone networks are developed on the basis of crossbar stations of the ATSK-100/2000 and ATSK-50/200 types. With respect to their technical characteristics, they are at the level of analogous foreign systems and satisfy the YeASS [Unified Automated Network of the Soviet Union]. Work has been completed on their modernization and adaptation to the new conditions necessitated by the automation of intercity and zonal communications. Instruments for determining the number of the calling subscriber were developed for ATSK-100/2000U and ATSK-50/200M. The equipment of these stations will make it possible to accomplish the interaction of VPTS with production control communication devices. In the process of modernization, sets of testing and aging equipment have been created.

Work has been completed on the development of integrated quasi-electronic analog-digital stations "Istok" (IKE ATsSS [integrated quasi-electronic analog-digital stations]) of low and medium capacities. The station interacts with the ATS of all types existing in the STS networks and provides as many as 20 additional services. A rural variant of the "Kvant" station is being developed. Experimental operation of the "Istok" station is being conducted. During the Eleventh Five-Year Plan, it is planned to deliver from the GDR a considerable number of "Istok" stations and to switch our industry to the production of "Kvant" stations.

The wide-scale development of STS requires a sharp increase in the number of interstation connecting lines, due to which high-frequency transmission equipment is being intensively introduced at STS. From 1971 to 1978, the amount of high-frequency channels in STS of the country increased by 3.6-fold.

The overhead lines are using the systems V-2-2 and V-3-3 S produced domestically and VO-12-3 produced by the Hungarian Peoples Republic; the cable lines use KNK-6T and KNK-12 produced by the Czechoslovakian Socialist Republic and domestic transmission systems IKM-12 and "Zona".

For organization of interstation communications in almost inaccessible regions, the radio relay equipment "Konteyner" and "Elektronika-M" with 60 channels supplied to rural areas is used.

Work is being done on the developing of series production of the second generation of equipment with pulse-code modulation based on integrated circuits with an eight-digit coding of the type of IKM-15. At the end of the Eleventh Five-Year Plan, it is planned to produce IKM-15S (IKM-15 x 2) instruments.

Line tests have been conducted for the multichannel transmission system KS-60 +60 intended for the organization of connecting lines up to 100 km in length through an KSPP cable. The length of the amplification section is 6 km. This equipment makes it possible to isolate 12-channel groups, which will make it possible to build rural communication networks more optimally.

It is planned to conduct line tests of the equipment V-12-12 constructed on the modern component base instead of the apparatus VO-12-3. The testing of the radio relay communication complex IKM SVCh "Radan" is in progress. This complex has two trunks through which transmission is organized with the aid of the equipment IKM-12 or "Zona". For direct communication of the managers of farms and dispatcher services, a complex of equipment of subscriber communication through the channels of a transmission system AS-VCh has been developed. It makes it possible to connect telephone sets of directors of sovkhozes and kolkhozes to the ATS of a rayon center through any free channel.

The KSPPZ-type cable with hydrophobic filler is used widely. With respect to its characteristic of reliability and stability against the effect of moisture, it is considerably better than the KSPP cable. Large-capacity cables are being developed: with a hydrophobic filler, with aluminum-copper conductors, as well as with steel conductors (for production control communication).

Intensive development of rural telephone networks and their reequipment require constant improvement of skills of the maintenance personnel. In the course of many years, the USSR Ministry of Communications has been training the operating personnel in a centralized manner in special courses given in Moscow, in educational institutions and at plants manufacturing the equipment. About 2500 people go through such training every year. Apart from the centralized training, the PTUS and republican ministries of communications provice advanced training to about 3000 people.

In a number of PTUS of Ukrainian, Belorussian, Lithuanian, and Latvian union republics, in Arkhangel'skiy, Novgorodskiy, Volgogradskiy, Novosibirskiy, Murmanskiy, and other PTUS of the RSFSR, production control services have been organized for monitoring the condition of communication facilities and their prompt restoration in case of damages. In Krasnodarskiy, Leningradskiy, and Smolenskiy PTUS of the RSFSR, ministries of communications of the Ukrainian, Belorussian, Moldavia SSR and others, experience has been accumulated in centralized servicing of station and line structures and transmission systems via rural communication lines with the use of a special complex of equipment. It was noted in the reports of the representatives of the above-mentioned enterprises that such a system of servicing makes it possible to increase labor productivity considerably and broadens the possibilities of line mechanical repair shops in conducting maintenance and repair jobs.

The speaker dwelt in detail on the shortcomings in the work of rural telephone communications.

In spite of the acute shortage of transmissions systems, many administrations, having received the equipment, do not put it into operation for a long time.

Damages resulting from the tearing of cables by other organizations amount to a large sum of money. Interruptions of communication are still as long as before.

The network has many blocked instruments. There are instances of refusal of putting through long-distance calls. The quality of telephone communication is not always checked. Storage batteries work, as a rule, only in the buffer mode, and no control discharges are made. Station grounding devices often do not comply with the existing norms. In many instances, station buildings do not meet the technical requirements.

Occupational injuries are still at a high level in rural networks due to dangerous crossings, poorly reinforced supports, and sometimes due to a low production discipline.

These and other defects named by the speaker were taken into consideration in preparing recommendations of the conference.

The speaker concluded his speech by appealing to all workers of rural communications to give careful consideration to the measures directed toward the fulfillment of the goals of the Tenth Five-Year Plan and the resolutions of the USSR Council of Ministers for rural and production-control communications everywhere.

The practical contribution of communication workers to the intensification of agrigultural production must be a radical improvement of the work quality of the communication agencies in rural areas, increased effectiveness of the utilization of the equipment, and the raising of the services for agricultural workers to a new level.

P. I. Shipulin (Krasnodarskiy Kray PTUS) stressed in his address that the introduction of a centralized control system in the Timashevskiy Rayon of the kray makes it possible to check all communications in the rayon in 30-50 minutes, and the daily three-time verification of connecting lines has ensured a systematic control over the work of communication channels and ATS instruments.

A large number of reports delt with the problems of the development and introduction of new equipment at STS. Yu. A. Baklanov (Riga Department of TsNIIS [Central Scientific Research Institute of Communications]) discussed methods and means of technical servicing of stations "Istok". Yu. A. Parfenov (LONIIS [Leningrad Branch of the Scientific Research Institute of Communications]) explained to the participants the present state and future prospects for the development of STS cables; he discussed some problems of using hermetically sealed single-quad cables of the KSPPZ-type and multiple-pair cables of the PTEPZ-type. He also told about fundamentally new possibilities of designing cables for digital transmission system.

The experience of the introduction and operation of the IKM-SVCh [pulse-code modulation-microwave] "Radan" and "Elektronika-M" systems was reported by I. T. Vorozhtsov (Tula PTUS) and B. N. Zolotarev (Kirov PTUS). New developments in the transmission systems for rural networks were reported by E. Z. Rapoport (TsNIIS).

The results of the introduction of digital transmission systems (TsSP) in rural networks of the country were reported to the participants by V. I. Petrov (Odessa Department of TsNIIS). The system of the introduction of TsSP developed in Odessa made it possible to increase the percentage of the introduction of the equipment from 22% in 1973 to 77% in 1978. Among other things, the speaker mentioned that, in order to accelerate the introduction of new equipment, it is necessary to create zonal laboratories which will make it possible to perform repair jobs efficiently and thus to increase the quality of technical maintenance of communication facilities.

It is necessary to note the important role which was played by the Odessa Department of the TsNIIS in the introduction of transmission systems with IKM [pulse-code modulation] and in the training of their maintenance personnel.

A number of reports delt with advanced methods of operation of STS facilities and experience in the introduction of systems of control and monitoring of the work of the networks.

The participants of the conference discussed proposals for radical improvement in the services to the population and agricultural production by telephone communication facilities. As a result of the work of the conference the following recommendations were adopted: to consider that the main goal of the Tenth Five-Year Plan is strict fulfillment of the goals set forth in the decree of the USSR Council of Ministers "On Measures for Further Development of Telephone Communications in Rural Areas and Production-Control Communication in Agricultural Production"; managerial personnel of RUS [regional communication centers], ETUS [technical operations communication centers], shops, and sections are to give special attention to correct introduction of the primary registration of the quality of operation of STS, and heads and chief engineers of PTUS are to control constantly the data of the primary registration; to establish strict control over correct planning of routine maintenance and major overhauls of line structures and to ensure skilled inspection and approval of such jobs; to use widely the centralized method of maintenance of STS facilities, as well as a complex system of quality control in communications; to organize constant local checking of the quality of delivered equipment and timely presentation of complaints to the manufacturers; to ensure the introduction of IKM [pulse-code modulation]-12M, IKM-microwave, "Elektronika-M" equipment in 1979; to improve the work on safety precautions and labor protection, giving special attention to the elimination of dangerous crossings of communication lines with electric power transmission lines, as well as to the reequipment of subscribers' service wires which do not correspond to the technical norms; to make free capacities of telephone stations more fully operational; to improve the quality of construction, to control systematically the quality of construction and installation jobs; not to allow approval of STS structures which have flaws in workmanship; to accelerate work on the creation and series production of a complex of equipment for a system of technical control and checking STS equipment; to spread socialist competition for the fulfillment and overfulfillment of planned goals, improvement of the operation quality of STS structures, and advanced methods of communication services to the population.

The Krasnodarsk conference, which was well organized and stated the acute fundamental problems of the development of rural telephone communications, will definitely contribute to the improvement of the operation quality of this sector and, consequently, to the solution of the important government goal of the intensification of agricultural production.

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FRANCE

INTELSAT 5 LAUNCHES, FOLLOW-ON INTELSAT 5'S DISCUSSED

Paris AIR & COSMOS in French 6 Oct 79 pp 47-48

[Article by Pierre Langereux: "First Intelsat 5 to be Launched in Early 1980"]

[Text] The launch of the first communications satellite in the new Intelsat 5 series has been postponed several months. Initially scheduled for launch in late 1979, it will now be placed in orbit in late February 1980, according to an announcement made by Intelsat [International Telecommunications Satellite Organization] at the Telecom 79, World Telecommunications Exhibition, in Geneva. The second Intelsat 5 is due to be launched between April and June 1980, also over the Atlantic Ocean, so as to have both of the new satellites operational by mid-1980. One of the two spacecraft over the Atlantic will be operational, while the other will serve as its in-orbit backup. The next two Intelsat 5's (Nos 3 and 4) will also be launched in 1980, during the second half of the year, but over the Indian Ocean. One will be operational, the other on standby.

The fifth Intelsat 5 spacecraft is currently scheduled for launch in April 1980 by an Atlas Centaur vehicle instead of by NASA's space shuttle as initially planned. This change is due to a substantial delay in development of the American space shuttle which will not be operational before September 1981 (instead of February 1981). NASA announced on 26 September that it had, therefore, ordered an additional Atlas Centaur launch vehicle from General Dynamics at a cost of 11.165 million dollars under the terms of a fixed-price contract.

Intelsat had initially planned to have the first four Intelsat satellites launched by Atlas Centaur rockets, and the following three--Nos 5, 6, and 7--by the NASA shuttle and the European Ariane launch vehicle. Consequently it had ordered two space shuttle launches (the first in April 1981) with Atlas Centaur rockets for backup, and one Ariane launch with an option for a second Ariane launch as backup. Thus NASA's decision to go back to an Atlas Centaur vehicle for the fifth Intelsat 5 launch is not expected to alter the Ariane order and option. The first Ariane launch of an Intelsat 5 is scheduled, by contract, for July 1981.

Eighth Intelsat 5

Intelsat has recently ordered an eighth Intelsat 5 spacecraft from Ford Aerospace for use over the Atlantic Ocean region because of the anticipated increase in traffic between Europe and the Americas: 114 percent through 1983! Estimated cost of this additional satellite is 38 million dollars. This eighth Intelsat 5 is to be launched in 1982, but no choice of launch vehicle has yet been made. In principle, that vehicle should be the space shuttle. Like the three preceding Intelsat 5's, the eighth satellite will be equipped to handle maritime communications for Inmarsat [International Maritime Satellite Organization].

This will bring the total cost of the series of eight Intelsat 5 satellites to more than one-half billion dollars. In late 1976, the American Ford Aerospace firm, prime contractor for Intelsat 5, was awarded a 235-million dollar contract for the first seven satellites to be built in cooperation with Aerospatiale and Thomson-CSF of France, GEC-Marconi of Great Britain, Messerschmitt-Boelkow-Blohm of Germany, Mitsubishi Electric Corp of Japan, and Selenia of Italy. Intelsat has placed the total cost of the first seven satellites and their launches at 508 million dollars.

Post-Intelsat 5 Satellites

Even though the first satellites of the new Intelsat 5 series have not yet been launched, Intelsat is already preparing for the future, in other words, for the "post-Intelsat 5" generation. Intelsat currently leases 15,000 telephone circuits, several channels for intercontinental TV programs, as well as 14 satellite transponders for the domestic communications systems of certain member countries who do not yet have their own satellite. But space communications traffic continues to increase at a rate of 20 percent per year! Under these conditions, the capacity of the satellites in service has to be doubled every 4 years! New satellites must, therefore, be built within the same space of time: the Intelsat 4 satellites began service in 1972, the Intelsat 4A's in 1976, and the first Intelsat 5's will begin service in mid-1980. Intelsat plans to have the future-generation Advanced Intelsat 5 and Intelsat 6 satellites in service by 1984 and 1986 respectively. Space communications technology actually becomes absolescent much sooner (4 years on the average) than the satellites whose design lifetimes is some 7 years. Hence it is desirable to change the generation of satellites rather than launch additional obsolescent models, except for very immediate requirements.

Intelsat has initiated a comparative economic study of proposed future spacecraft, the Advanced Intelsat 5 or the Follow-on Intelsat 5, that will replace the present Intelsat 5's starting in 1984. The goal is to provide 20-80 percent greater capacity per satellite with a "moderate" use of new technologies. The successors to Intelsat 5 will still operate in the 6/4 GHz and 14/11 GHz bands--to avoid having to replace present earth stations--but with even more directional antennas so as to enhance the satellite's capability of reusing frequency bands. The new 30/20 GHz frequency bands will not be used on Intelsat satellites until after the Intelsat 6 generation, in other words in the late 1980's or early 1990's.

Hughes Aircraft and Ford Aerospace Proposals

Industrial competition for this new generation of Advanced Intelsat 5 satellites has already begun, as was quite obvious at Telecom 79 where both Ford Aerospace and Hughes Aircraft exhibited proposed versions corresponding to the various options being considered by Intelsat. The Advanced Intelsat 5's will, in fact, have to accommodate more domestic communications in addition to international communications which constitute Intelsat's primary service. Ford Aerospace has designed an Intelsat 5M satellite, a variable configuration (onboard circuit switching) satellite capable of working in either international or domestic service modes. Ford Aerospace has also proposed various Delta class satellites with a domestic service or a hybrid service capability. Hughes Aircraft, manufacturer of the Intelsat 1, 2, 4, and 4A satellites, is reentering the Intelsat market with its newly designed Advanced Intelsat Satellite (AIS) displayed at Telecom 79. AIS uses a Syncom 4-type of large platform (wide-body satcom) which has already been used in development of the U.S. Navy's Leasat communications satellite. According to Hughes Aircraft, the AIS design provides 60 percent more capacity than the Intelsat 5 satellites, while also reducing annual satellite circuit operating costs by 15 percent.



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FRANCE

STATUS REPORT ON ESA COMMUNICATIONS SATELLITE PROJECTS

Paris AIR & COSMOS in French 13 Oct 79 pp 49-50, 56

[Article by Pierre Langereux: "Europe in the Communications Satellite Age"]

[Text] Upon the occasion of Telecom 79, the World Telecommunications Exhibition, in Geneva, the European Space Agency (ESA) released a status report on the following European communications satellite programs: OTS [Orbital Test Satellite], ECS [European Communications Satellite], Marecs [Maritime Communications Satellite], L-SAT [Large Satellite], plus plans for large multimission platforms.

OTS-2

The first experimental communications satellite developed as a collaborative European project, the OTS-2, was launched on 11 May 1978. It is continuing to function satisfactorily some 16 months later. An evaluation of the satellite's performance made during an initial test phase showed that it was operating better than expected, except for a few irregularities noted in certain subsystems. ESA explained that these irregularities were not interfering with the satellite's mission. The agency is continuing to check the spacecraft's condition every 6 months.

ESA and the Interim Entelsat organization have been jointly conducting an in-orbit test program with the OTS-2 for the past year. This program is coordinated by the European Broadcasting Union's (EBU) technical center. In addition to purely scientific measurements, the program also covers telephone, television, and data-transmission demonstrations, particularly over Europe and countries in the Mediterranean basin. For instance, communications were recently established via OTS-2 with Egypt, Morocco, and Algeria. Four large ground stations are being used for this program. They operate in the new 14/11 GHz band with antennas of 14.5 meters to 19 meters in diameter. The four stations are at Bercenay-en-Othe, France, Usingen, Germany, Goonhilly Downs, England, and Fucino, Italy. In addition, some 30 small stations with antennas of 3 to 11 meters in diameter are scattered throughout Europe and used for propagation experiments, primarily with television transmissions. The following major European national television services are participating in these experiments: Frances

TDF (Limours station), Germany's IRT (Munich), Austria's ORF (Graz), Belgium's RTBF (Louvain), Italy's RAI (Turin), BBC (Kingswood Warren), Northern Ireland's IBA (Crawley Court), Ireland's RTE (Dublin), and France's CCETT (Rennes). Results obtained thus far show that European satellites will make it possible to augment means of communication considerably both inside Europe as well as in bordering countries.

New Experiments With OTS-2

Several new communications satellite experiments will be conducted shortly with the OTS-2 spacecraft.

The STELLA (Satellite Transmission Experiment Linking Laboratories) experiment calls for scientific data transmission by means of small terminals between the European Council for Nuclear Research (ECNR) in Geneva and several high-energy physics research centers in Germany, France, Italy, and Great Britain.

The SPINE (Space Informatics Network Experiment) is designed to assess the feasibility of high-speed data transmission. It will include, inter alia, tests of the digital transmission of imagery from remote earth sensing satellites between ESRIN [European Space Research Institute] in Frascati, Italy, and the Royal Aircraft Establishment (RAE) in Farnborough, England. Other applications to be investigated include data transfer between computers, high-speed facsimile transmission, and teleconference services. Discussions underway with other likely participants--Sweden, Austria, etc--are expected to broaden the scope of the SPINE experiment to encompass establishments not belonging to ESA.

The VLBI (Very Long Base Interferometry) experiment was prepared by radio astronomers with ESA support. It is designed to test the technique of synchronizing the local clocks of distant radio telescopes by means of satellite transmissions. This technique is part of ESA research being conducted in cooperation with radio astronomers for the purpose of defining a long-range program likely to permit operational use of a satellite to process interferometer readings between distant radio telescopes.

Five ECS for Europe

Last April, ESA member countries approved furnishing the Interim Entelsat organization five ECS with which to establish the intra-European regional communications satellite system (telephone, teletypewriter, TV, etc.) and ensure its operation for the next 10 years. These satellites will be built by the MESH consortium headed by the British Aerospace Dynamics Group and including such firms as Matra, Erno, Saab, etc.

The contract signed on 15 May 1979 by ESA calls for ESA to furnish the space segment of the ECS system for a period of 10 years. Interim Entelsat will become owner of the satellites as soon as they become operational and will assume sole responsibility for management of the system. The ground stations--with 14 to 18-meter antennas--for use with the ECS will be built and operated by the telecommunications administrations of Interim Entelsat member countries. The large OTS ground stations may also become part of the ECS system.

Entelsat members participating in the ECS program are: Germany (11.31 percent), Austria (2.06), Belgium (5.14), Denmark (3.43), Spain (4.86), Finland (2.86), France (17.15), Italy (12), Luxembourg (0.23), Norway (2.63), Netherlands (5.72), Portugal (3.2), United Kingdom (17.15), Sweden (5.72), Switzerland (4.57), Turkey (0.97), and Yugoslavia (1 percent).

The European communications satellite system will consist of two satellites in geosynchronous orbit at all times: one operational satellite at longitude 10 deg. E and one backup satellite at longitude 12 deg. E. These spacecraft will also operate in the new 14/11 GHz band and benefit from experiments conducted with OTS-2. They will be able to handle up to 12,000 telephone calls simultaneously and two color television programs for EBU's Eurovision service the first satellite, ECS-1, is to be launched by an Ariane rocket in late 1981, and the second, ECS-2, about 10 months later in 1982. ESA explained that the other three satellites (ECS-3, -4, and -5) will not necessarily be identical to the two earlier satellites. The agency is considering the possibility of developing a second-generation satellite, but the actual decision will be up to Eutelsat.

Three Marecs For Inmarsat

In July, ESA member countries approved procurement of a third Marecs maritime communications satellite, derived like its two predecessors from the ECS platform. ESA considers this third Marecs to be an integral part of its proposal submitted to Inmarsat, the International Telecommunications Satellite Organization. This approval by ESA members authorized the agency to award the contract--25 million EEC accounting units--to British Aerospace Dynamics Group, prime contractor for the first two Marecs. It also directed the agency to take appropriate measures to procure equipment for the ground station to be built in the Pacific Ocean region.

Inmarsat's future global system will, in principle, consist of three Marecs spacecraft furnished by ESA and at least three, possibly four, Intelsat 5 spacecraft equipped with an L-band repeater for maritime communications (in addition to their primary mission of intercontinental public communications service). In response to a request from the 18 countries of the Joint Venture group, a request endorsed by Europeans, ESA has renewed its offer to Inmarsat's governing council for the furnishing of three Marecs. The agency proposed three options:

1. Two in-orbit satellites, Marecs A and B, covering the Pacific Ocean, plus a third nonlaunched backup satellite, Marecs C, with ground stations for control of the two satellites for a 7-year period;

2. Three in-orbit Marecs, including two operational spacecraft covering the Atlantic and Pacific Oceans, plus a third orbiting backup satellite above the Indian Ocean, with similar ground facilities and service. The backup satellite could be launched by the American space shuttle.

3. Three operational Marecs orbiting over the three oceans, plus the launching of a backup satellite and the furnishing of ground services.

In any event, ESA plans to launch the first two satellites, Marecs A and B, by the Ariane rocket in 1980 and 1981, with the decision to launch the third Marecs being up to Inmarsat.

The Inmarsat governing council met in Brighton, England, on 16 July to examine subscriptions by member countries (currently 26). A technical and operational committee will meet in Athens 9-16 October to open discussions on the Inmarsat system's space segment. The first assembly of the full Inmarsat membership is scheduled for 24-26 October.

Decision on L-SAT in November

At its 25-26 July 1979 meeting, the ESA council approved a resolution calling for development of a new European satellite, the L-SAT (Large Satellite). This is a standard heavy platform of 2.3 tons in a geosynchrous transfer orbit, optimized for launch by the new Ariane 3 version of the European rocket, but also compatible with the American space shuttle.

The resolution was approved by 10 ESA members with Germany abstaining. Five member countries agreed to finance the initial phase of the L-SAT project. They were Great Britain (majority investor), Netherlands, Italy, Switzerland, and Denmark. Other subscriptions will be accepted until October 1979. France, however, has already announced it will not participate in the L-SAT project because it has decided to develop national French and German direct television broadcasting satellites in bilateral cooperation with Germany. This situation will also create the problem of choosing the future Ariane heavy platform from among the platforms for L-SAT, TDF-1 [French direct TV broadcasting satellite], and TV-SAT [German direct TV broadcasting satellite].

The L-SAT project will be submitted to ESA's communications steering committee at its next meeting in November 1979. If the committee approves, development of the satellite will begin with phase B which will be completed in October 1980. Phases C and D will then follow over the next 3 years, with launch of the L-SAT scheduled for the second half of 1983.

As of 21 September, ESA had already received proposals from British Aerospace Dynamics Group and Marconi Space and Defense Systems in response to its request for bids on development of the L-SAT platform. At its July meeting, the ESA council agreed that this project would be awarded to a British prime contractor. At the same time, ESA is also making preparations for development of the L-SAT payload. Negotiations are in progress with the European Broadcasting Union (EBU) and other potential users, including the Scandinavian countries who are preparing the Nordsat direct TV broadcasting satellite project.

L-SAT will be an experimental satellite designed for demonstration purposes. Its multimission payload will include at least two 12 GHz direct TV channels, one of these for an experiment with Italy, plus a repeater for 1-GHz broadcasting, a 30-GHz beacon, and advanced communications systems. L-SAT is to be designed to cover the future requirements of Europe (second and third generation ECS follow-on satellites), the Third World, and the Intelsat system's fixed service.

ESA Studying Large Communications Platform

For the more distant future, ESA is already studying plans for large geosynchronous orbit communications platforms. The U.S.A. also has such a platform under study. These platforms would be very large multimission spacecraft with a possible payload of 2 tons. One of the concepts favored by Europeans calls for a modular space structure that could be assembled in orbit in successive stages. This concept would also permit replacing failing parts without having to shut down the spacecraft completely. The payload's configuration could also be modified in orbit to keep pace with changing requirements. This large modular multimission spacecraft could, of course, be put into orbit by Ariane launch vehicles.



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